air, he tried this with perfect success in Uruguay; he supposes that curiosity was the motive. A large coral upon the copper of a man-of-war, Capt. King states, is not unprecedented; he remembers in 1839 seeing one of the size and shape of a large cauliflower, taken from the bottom of a vessel of the Indian navy, in the Persian Gulf, by a pearl-diver.

PROF. GRAHAM BELL has promised to read a paper before the Society of Arts upon his "Photophone" at the ordinary meeting on Wednesday, December 1. As considerable interest is likely to attach to this paper it is announced that only members of the Society can be admitted, and that they will be required to provide themselves with special tickets issued for the occasion.

WE referred in the "Physical Notes" of our issue of November 11 to a paper read before the American Association at Boston by Prof. Young, which combated certain phenomena in thermo electricity which were alleged to have been observed by Herr Exner. We have since received from Mr. T. Brown of Belfast a letter in which, on behalf of Prof. Franz Exner of Vienna, he expressly disavows any such discoveries as those which Prof. Young has set himself to refute. We readily accord to our courteous correspondent the opportunity for this disavowal, since any reflections cast even inadvertently upon the accuracy of Prof. Franz Exner's work might unfairly prejudice readers against the general reliability of the researches which he has published in another department of science, and which our readers are aware are just now exciting considerable attention.

IN NATURE, vol. xxii. p. 616, it was stated, on the authority of the Japanese papers, that Prof. Atkinson had, "during a sojourn in the Mitake Mountains of the Province of Koshu, discovered another valuable deposit of coal." We are now informed that although Mr. Atkinson visited the Mitake Mountains last summer, he can lay no claim to so important a discovery.

THE Hon. Sir Ashley Eden, K.C.S.I., has appointed Babu Ambika Churn Sen, M.A., and Synd Sakhawat Hossein, B.A., a native of Behar, to the two scholarships of 200*l.* a year each, recently created by the Bengal Government to be held at the Royal Agricultural College, Cirencester.

THE Procureur-General of Paris having sent an explanatory note stating that he did not mean to attack the character of the medical advisers of the public prosecutor, but merely to give vent to his peculiar views, these gentlemen have withdrawn their resignations and resumed their work.

THE Cutlers' Company have arranged for a course of lectures being delivered, or papers read, at the hall of the company during the ensuing winter season. The course will consist of four lectures or papers upon subjects intimately connected with the materials used in the manufacture of cutlery, the lectures to take place on the following dates:—Wednesday, December 1, 1880; Wednesday, January 5, 1881; Wednesday, February 2, 1881; Wednesday, March 2, 1881. Sir Henry Bessemer, C.E., F.R.S., has promised to commence the course, and will, on December 1, read a paper "On the Manufacture and Uses of Steel, with special reference to its employment for Edge Tools." The admission will be entirely free, but by ticket, which may be obtained on application to the hon. secretary, addressed to the Cutlers' Hall.

IT is announced that the electric cable manufacturing firm, Berthoud Borel and Co. of Cortaillod, in Neuchâtel, have made a highly important discovery in practical telegraphy. After a long and expensive series of experiments they have succeeded in devising a method of laying cables whereby the inductions of the electric current from one wire to another, although the wires are in juxtaposition, is prevented. This discovery, it is asserted, removes the last obstacle in the way of the widest possible extension of facilities for telephonic communication.

OUR ASTRONOMICAL COLUMN

THE THIRD COMET OF 1869.—This comet, the orbit of which has so close a resemblance to that of the comet discovered by Mr. Swift on October 11, was detected at Marseilles by M. Tempel on November 27, 1869, in the constellation Pegasus, and appears to have been last observed on December 31 at Leipsic and Kremsmunster, the hope of seeing it after the next period of moonlight not having been verified. On November 29 Dr. Vogel, observing at Leipsic, described it as a very faint large object elongated in the direction of the declination circle: in the comet-seeker its diameter was about 6′. On December 7 it was still very faint, large, and elongated in the direction 300°, the central condensation very slight. On the following night its diameter was 5′; it had "a peculiar milky appearance" and hardly any central condensation, so that observations were attended with difficulty. On the 21st it was seen only with much exertion of the eye, but on the 31st, though the comet was very faint, Prof. Bruhns considered his separate comparisons certain to about ten seconds of arc. At Kremsmunster Prof. Strasser found it "extraordinarily faint" during its entire visibility, and in consequence of wanting central condensation, very difficult to observe, and hence considered that his positions would not possess the ordinary degree of accuracy. The elements of the orbit were calculated by Tiele, Oppolzer, Schulhof, and Bruhns, the parabolic orbit published by the latter in No. 1788 of the *Astronomische Nachrichten* being founded upon nearly the whole extent of observation; he remarks with respect to it:—"Eine angestellte Vergleichung hiesigen Beobachtungen scheint aber doch auf eine Abweichung der Bahn von der Parabel hinzudeuten . . ." We are not aware that any further examination of this point was made. If the period of revolution be really something less than eleven years, the circumstance of the comet having escaped observation prior to 1869 will not nevertheless occasion surprise, considering that both in 1869 and 1880 it has approached near the earth and has yet been very faint and diffused, so that when the perihelion passage has occurred at other seasons of the year it might be beyond reach of the telescope. It will be most essential for the theory of the comet's motion that observations should be continued as long as possible at the present appearance, that if it prove to be one of short period its next return to perihelion may be closely predicted: the computation of the planetary perturbations during the period 1869–80 will of course be a necessary process with this object in view.

THE STAR LALANDE 1013-4.—Mr. G. Knott has examined this star, to which we lately drew attention, as being credited with the very discordant magnitudes 5, 7·7, and 10. He writes from Cuckfield on November 21: "I looked the star up on November 8 and again on November 19, and found it on each occasion 7·9 mag., and sensibly equal to B.D. + 51°, No. 131, which forms a convenient comparison star. This estimate, it will be seen, agrees nearly with that in the *Durchmusterung*; Harding marks the star 6m.

CHEMICAL NOTES

IN the last number of the *Berichte* of the German Chemical Society Herr v. Lippmann describes experiments which show that a solution of pure cane sugar, when charged with carbon dioxide, is slowly converted into inverted sugar. If the carbon dioxide be pumped into the sugar solution under pressure, the rate of inversion is considerably increased: at 100° the inversion takes place rapidly.

IN the *Annales Chim. et Phys.* the results of M. Raout's experiments on the freezing points of alcoholic liquids are detailed. An aqueous solution of alcohol containing 1·6 per cent. by volume freezes at – 0·5; a solution containing 47·9 per cent. freezes at – 32°. The freezing point of solutions containing from 24 to 51 gram alcohol per 100 grm. water is decreased by 0°·528 for each gram of alcohol: when more than 51 grm. alcohol are present to 100 grm. water no regular decrease in the freezing point was observable. The freezing points of various wines are given in the paper referred to.

IN *Comptes rend.* M. Kessler announces that he has prepared a crystallised hydrate of hydrofluosilicic acid, viz., $H_2SiF_6 . 2H_2O$. The hydrate is a hard, colourless, very deliquescent solid, which fumes strongly in air, and melts at about 19°.

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In the same journal M. de la Source describes his experiments on the dialysis of ferric oxide dissolved in a solution of ferric chloride. "Fer Bravais" of medicine consists of $30Fe_2O_3 . Fe_2Cl_6$; after three months' dialysis of a dilute solution of this substance the greater part of the chlorine had passed into the dyalysate, the proportion of ferric oxide to chloride was then $116Fe_2O_3 . Fe_2Cl_6$, and the chlorine yet continued to pass through the dialyser. The author thinks that ferric hydrate is, *per se*, under certain conditions soluble in water.

Herr A. Herzen describes in *Bied. Centralblatt* some experiments on acetous fermentation. In each of three flasks was placed 100 c.c. pure water: to the first flask 10 per cent. pure alcohol and a drop from the surface of a fermenting wine full of *Mycoderma aceti* were added; to the second flask were added 5 per cent. of pure acetic acid and a drop of the fermenting wine; and to the third flask were added 5 per cent. acetic acid, 5 per cent. of a saturated solution of boric acid, and a drop of the fermenting wine. After eight days at 25° no *Mycoderma* appeared in the first flask, much appeared in the second, and a little in the third. Hence the author concludes that *Mycoderma aceti* lives at the expense of acetic acid already formed in wine, and that it does not cause the transformation of alcohol into acetic acid, but that it is rather a consequence of this chemical change; further, that boric acid retards the development of *Mycoderma*, but does not prevent it in presence of already-formed acetic acid.

In *Dingler's Polytech-Journal* a paper appears by Drs. Lunge and Schäppi, on bleaching-powder. The results confirm the now generally accepted formula first proposed by Odling, viz., $CaOClCl$.

It was shown some time ago by H. T. Brown that alcoholic fermentation proceeds more slowly under diminished than under ordinary pressure. According to Boussingault (*Compt. rend.*), however, sugar is rapidly transformed into alcohol by the action of yeast, if the carbon dioxide and alcohol, as these are produced, be rapidly removed from the fermenting liquid. Addition of alcohol soon stops fermentation under ordinary circumstances; Boussingault shows that if the vessel containing the fermenting liquid be connected with an air-pump which is worked energetically, fermentation proceeds rapidly even when a considerable amount of alcohol has been added to the liquid.

In connection with the recent liquefaction of ozone by Hautefeuille and Chappuis, the following numbers, from a paper by the same authors in *Compt. rend.*, are of interest, as showing the exact influence of temperature and pressure on the ozonising of oxygen. Diminution of pressure does not tend to increase the amount of ozone produced, but decreased temperature exerts a marked action in increasing the amount of oxygen transformed into ozone:—

Tension of	Tension of ozone.				Proportion of ozone by weight.			
oxygen.	−23°	0°.	20°.	100°.	−23°.	0°.	20°.	100°.
760	108·70	82·84	53·96	—	0·214	0·149	0·106	—
380	51·68	38·76	31·54	1·48	0·204	0·152	0·125	0·0117
300	40·20	30·60	22·20	—	0·201	0·1525	0·112	—
225	24·80	22·95	15·52	0·088	0·191	0·153	0·104	0·0118
180	22·30	16·58	10·52	—	0·181	0·137	0·089	—

A. Ditte describes in *Compt. rend.* a number of new fluorine compounds of uranium; the most important are $UF_6 . 8HF$ and UO_2F_2, produced by the action of hydrofluoric acid on the oxide U_3O_8; when the former compound is heated in a closed platinum dish it melts, gives off hydrofluoric acid and small quantities of the oxyfluoride UOF_4, which compound is produced in larger quantity by heating the above-mentioned oxyfluoride, UO_2F_2, in a closed vessel. The hexfluoride UF_6 is produced by heating the double salt $UF_6 . 8HF$ in an open crucible. Various double salts are also described, the general formula being $UO_2F_2 . 4MF$, where M may be K, Na, Li, Rb, or Tl.

Cleve has made a redetermination of the atomic weight of the very rare metal erbium (*Compt. rend.*). Assuming the formula of the oxide to be Er_2O_3, the atomic weight of the metal is 166. Pure erbia, Er_2O_3, is a beautiful rose-coloured earth, slowly soluble in acids, having a specific gravity of 8·64, and forming salts characterised by a deep-red colour; several of these salts are described by Cleve.

The same author has succeeded in separating nearly pure *thulium*; this metal and its salts are colourless, but solutions of the salts show two absorption bands, one strongly marked in the red, and one broad band in the blue. The atomic weight of thulium is 129·6 or 170·7, according as the metal is regarded as di- or tri-valent.

PHYSICAL NOTES

It is stated that amongst the recent discoveries of Prof. Bell in connection with the photophone research is the interesting fact that melted sulphur conducts electrically like selenium, but only at temperatures below that at which it thickens and becomes dark and viscid.

The *Comptes rendus* for November 2 informs us that Prof. Graham Bell and M. Janssen have attempted to *hear* with the photophone the sounds believed to accompany the rapid commotions taking place in the solar photosphere. The experiments were made at the Observatory of Meudon, a selenium cylinder being placed in different parts of an image of the sun some two feet in diameter. No very conclusive results were obtained, but M. Janssen has further suggested that a sort of concentrated effect might be obtained by passing a number of successive photographs of a sun-spot across a beam of light, the variations of the intensity of the beam producing sounds when they fall upon the sensitive "photophonic pile" of selenium. Some experiments in furtherance of this suggestion are now proceeding.

Having undertaken a series of researches upon the rapidity of evaporation of liquids, in dependence from the cohesion of molecules on their surfaces, M. Sreznevsky has measured how this rapidity varies with the variations of the height of the meniscus. He has established that, the diameter of the meniscus remaining invariable, the rapidity of evaporation increases as the height of the meniscus diminishes, that is, as its radius increases. There is however an anomaly as to this last law for distilled water: when the evaporation is measured in a meniscus the height of which is greater than the radius of its basis, the rapidity of evaporation increases throughout, however the radius of the meniscus begins by diminishing, and increases only after having passed through a minimum, but this minimum does not have a corresponding minimum in the rapidity of evaporation.

At the recent meeting of the Helvetic Society of Natural Sciences M. Forel described a *thermal bar* which is developed in winter parallel to the shore of a lake of fresh water, and which separates the pelagic from the littoral region. The water of the former region remains long, and in some lakes always, at a temperature above 4° C.; in the littoral region, if the winter be cold, the temperature descends between 4° and zero; and between the two there is a band of water at 4°, descending to the bottom—a kind of mountain with crest parallel to the shore and a talus on either side.

M. Dufour described at the same meeting an apparatus for indicating the variations of chemical intensity of the sunlight. It has some likeness to Draper's tithonometer; the principle is, opposing the variable action of light on a mixture of chlorine and hydrogen, with an electric current (of variable intensity, and measurable each instant), which by its passage causes decomposition of a quantity of hydrochloric acid equal to that produced by action of the light on the mixture of chlorine and hydrogen. The apparatus is like a Rumford differential thermometer; in one bulb is some hydrochloric acid solution, with carbon electrodes, in the other some sulphuric acid. The light acts on the former. One mode of measurement is to note the time taken in displacement of the sulphuric acid column a certain distance along the connecting tube. Then bring back the column to its original position by passing the current.

M. Pictet has lately made experiments (*Arch. de Sci.*) as to the dissolving power of gases and vapours on one another. Various solutions of alcohol and water were successively put into one of two glass balloons connected by a tube; pressure was diminished with an air-pump, so that the space became filled with vapours from the mixture. By closing the tapered point of the second balloon with the blowpipe, the apparatus allowed of distillation being effected with small differences of temperature. Plunging successively the balloon that held the solution in water at from 0° to 80°, and the other in water only 1° or a fraction of a degree below that of the liquid, M. Pictet got condensed products, the quality of which indicated what "affinity of solution" existed between water and alcohol. The following conclusions were arrived at: The weight of condensed liquid is proportional, in unit time, to

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